January 2024

Bethany Rittle-Johnson
Professor, Psychology and Human Development
Anita S. and Antonio M. Gotto Chair in Child Development
Peabody College 552
Vanderbilt University
Nashville, Tennessee 37203
Phone: 615-322-8301
Fax: 615-343-9494
bethany.rittle-johnson@vanderbilt.edu
http://peabody.vanderbilt.edu/departments/psych/research/research_labs/childrens_learning_lab/index.php
https://orcid.org/0000-0001-8001-942X

AREA OF SPECIALIZATION

My broad interests concern how people learn and how to improve their learning. My research focuses on learning of key concepts and problem-solving procedures within mathematics, with an emphasis on experiences that promote learning. I conduct this research in both laboratory and classroom contexts to better understand learning processes and contribute to improvements in math education.

EDUCATION

1999 *Ph.D., Developmental Psychology*, Carnegie Mellon University, Pittsburgh, Pa.
1996 *M.S., Developmental Psychology*, Carnegie Mellon University, Pittsburgh, Pa.
1994 *B.A., Psychology* (with Distinction), Biology minor, University of Virginia

PROFESSIONAL EXPERIENCE

February 2019 -	Anita S. and Antonio M. Gotto Chair in Child Devel
January 2019 – June 2022	Department Chair, Psychology & Human Devel.
Fall 2016 –	Professor, Vanderbilt University
Spring 2018	Visiting Scholar, University of Tokyo Graduate School of Education
Fall 2013 - Spring 2017	Developmental Sciences Program Head
Fall 2010 – Spring 2015	Associate Professor, Vanderbilt University
Fall 2002 – Spring 2010	Assistant Professor, Vanderbilt University

Summer 1999 – Summer 2002	Post-Doctoral Research Associate Pittsburgh Advanced Cognitive Tutor (PACT) Center Human-Computer Interaction Institute Carnegie Mellon University

HONORS AND AFFILIATIONS

Visiting Scientist Fellowship from the Scientific and Technological Research Council of Turkey, Spring 2024

Ranked as the second most prolific author in mathematics education research (Akın & Güzeller (2022). The 500 Most-influential Articles in Mathematics Education Research for The Period 1970-2020: A Bibliometric Citation Analysis. Journal of History School, 59. 2241-2270. http://dx.doi.org/10.29228/Joh.58195

Fellow, Association for Psychological Science, 2020

Anita S. and Antonio M. Gotto Chair in Child Development, Vanderbilt University

Excellence in Research Award, 2010-2011, Vanderbilt University, Peabody College.

NCTM (National Council of Teachers of Mathematics) Linking Research and Practice Outstanding Publication Award, 2011 for article "Comparison helps students learn to be better estimators" in *Teaching Children Mathematics*.

German-USA Early Career Research Exchange for Research on Learning Technologies and Technology-Supported Education, National Science Foundation, 2001-2002

NIMH/NRSA Post-Doctoral Training Grant, National Institutes of Mental Health, 2000 2001

Graduate Fellowship (for tuition and stipend), National Science Foundation, 1995-1998

Graduate Research Scholarship in Psychology, American Psychological Foundation, 1998

Affiliations: Kennedy Center

Member: Association for Psychological Science, Society for Research in Child Development, Cognitive Development Society, American Educational Research Association, National Council of Teachers of Mathematics.

PUBLICATIONS

BOOK CHAPTERS

Rittle-Johnson, B., Star, J., Durkin, K., & Loehr, A.* (in press). A Compare and Discuss instructional routine. Harring, M., Krupp, V., & Meyer, O. (editors) Deeper Learning in Teacher Training.

Douglas, A.,* Zippert, E.^, & Rittle-Johnson, B (2021). Parents' numeracy beliefs and their early numeracy support: A systematic review. Lockman, J. (Ed.) *Advances in Child Development and Behavior*, 61, 279–316. Elsevier. doi.org/10.1016/bs.acdb.2021.05.003

Rittle-Johnson, B., Star, J., Durkin, K. & Loehr, A. (2020). Compare and discuss to promote deep learning. Manalo, E. (Ed.). *Deeper Learning, Dialogic Learning, and Critical Thinking: Research-Based Strategies for the Classroom.* (pp. 48-64). New York, NY. Routledge.

Rittle-Johnson, B. (2019). Iterative development of conceptual and procedural knowledge in mathematics learning and instruction. Dunlosky, J. & Rawson, K. (Eds). *Cambridge University Handbook on Cognition and Education*. (pp. 124-147). Cambridge, UK. Cambridge University Press.

Schneider, M., Thompson, C. A., Rittle-Johnson, B. (2018). Associations of magnitude comparison and number line estimation with mathematical competence: A comparative review. In Lemaire, P. (Ed.) *Cognitive Development from a Strategy Perspective: A Festschrift for Robert S. Siegler*. (pp. 100 - 119). Stroud, U.K.: Out of House Publishing.

Rittle-Johnson, B. & Loehr, A. (2017). Instruction based on self-explanation. In R. Mayer & P. Alexander (Eds.) *Handbook of Research on Learning and Instruction.* Second edition. (pp. 349 - 365). New York, NY: Routledge.

Rittle-Johnson, B., Star, J. R., & Durkin, K. (2017). The power of comparison in mathematics instruction: Experimental evidence from classrooms. In D. C. Geary, D. B. Berch, & K. M. Koepke (Eds.), *Mathematical Cognition and Learning* (Vol. 3). (pp. 273-296). Waltham, MA: Elsevier.

Rittle-Johnson, B., and Jordan, N. C. (2016). Synthesis of IES-Funded Research on Mathematics: 2002–2013 (NCER 2016-2003) Washington, DC: National Center for Education Research, Institute of Education Sciences, U.S. Department of Education. This report is available on the Institute website at ies.ed.gov/ncer/pubs/20162003/

Star, J. & Rittle-Johnson, B. (2015). Toward an educational psychology of mathematics education. In L. Corno & E. Anderman (Eds.) *Handbook of Educational Psychology*. Third edition. (pp. 257-268). American Psychological Association. New York, NY: Routledge.

Rittle-Johnson, B. & Schneider, M. (2014). Developing conceptual and procedural knowledge of mathematics. In R. Kadosh & A. Dowker (Eds), *Oxford Handbook of Numerical Cognition*. Oxford Press. DOI 10.1093/oxfordhb/ 9780199642342.013.014

Rittle-Johnson, B., & Star, J. R. (2011). The power of comparison in learning and instruction: Learning outcomes supported by different types of comparisons. In J. P. Mestre & B. H. Ross (Ed.), *Psychology of Learning and Motivation*: *Cognition in Education (Vol. 55)*. (pp. 199-222). Waltham, MA: Elsevier. DOI 10.1016/B978-0-12-387691-1.00007-7.

Rittle-Johnson, B. & Siegler, R.S. (1998). The relation between conceptual and procedural knowledge in learning mathematics: A review. In C. Donlan (Ed.), *The development of mathematical skill* (pp. 75-110). Hove, UK: Psychology Press.

ARTICLES IN REFEREED JOURNALS

*student (graduate or undergraduate); ^post-doc

Adler, R.*, Rittle-Johnson, B., Hickendorff, M., & Durkin, K. (2024). A Longitudinal Examination of the Relations Between Motivation, Math Achievement, and STEM Career Aspirations Among Black Students. *Contemporary Educational Psychology*, *76*. https://doi.org/10.1016/j.cedpsych.2023.102240

Douglas^, A.-A., & Rittle-Johnson, B. (2024). Parental early math support: The role of parental knowledge about early math development. *Early Childhood Research Quarterly*, 66, 124–134. https://doi.org/10.1016/j.ecresq.2023.10.003

Adler, R.*, Xu. D.* & Rittle-Johnson, B. (2023 online first). What Counts as STEM, and Does it Matter. *British Journal of Educational Psychology*. doi.org/10.1111/bjep.12639

Douglas^, A -A., Msall, C.*, Rittle-Johnson, B. (2023). Developing and validating a measure of parental knowledge about early math. *Frontiers in Psychology: Developmental Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1116883

Msall, C.*, Douglas^, A. A., Rittle-Johnson, B. (2023). Parents' approaches to numeracy support: What parents do is rarely what they think is most important. *Frontiers in Education, 8. https://doi.org/10.3389/feduc.2023.1114803*

Durkin, K., Rittle-Johnson, B., Star, J. & Loehr, A.* (2023). Comparing and discussing multiple strategies: An approach to improving algebra instruction. *The Journal of Experimental Education*. 91, 1-19 https://doi.org/10.1080/00220973.2021.1903377.

Star, J., Jeon, S., Clark, P., Comeford, R., Rittle-Johnson, B., & Durkin, K. (2021). Compare and Discuss Multiple Strategies. *Mathematics Teaching: Learning and Teaching PK-12*, *114, 9-12.* https://doi.org/10.5951/MTLT.2021.0051

Zippert, E.^, Douglas, A.,* Tian, F.,* & Rittle-Johnson, B. (2021). Helping preschoolers learn math: The impact of emphasizing the patterns in objects and numbers. *Journal of Educational Psychology*, *113*, 1370–1386 https://doi.org/10.1037/edu0000656

Loehr, A.*, Fazio, L. & Rittle-Johnson, B. (2020). The role of recalling previous errors in middle-school children's learning. *British Journal of Educational Psychology, 90,* 997-1014*.* https://doi.org/10.1111/bjep.12341

Loehr, A.* Rittle-Johnson, B., Durkin, K. & Star, J. R. (2020). Does calling it 'Morgan's way' reduce student learning? Evaluating the effect of person-presentation during comparison and discussion of worked-examples in mathematics classrooms. *Applied Cognitive Psychology*, 34, 825-836. DOI: 10.1002/acp.3670

Rittle-Johnson, B, Farran, D. & Durkin, K. (2021). Marginalized students' perspectives on instructional strategies in middle-school mathematics classrooms. *Journal of Experimental Education,* 89, 569-586, doi.org/10.1080/00220973.2020.1728513

Rittle-Johnson, B., Star, J. R., & Durkin, K. (2020). How can cognitive science research help improve education? The case of comparing multiple strategies to improve mathematics learning and teaching. *Current Directions in Psychological Science,* 29, 599–609. https://doi.org/10.1177/0963721420969365

Zippert, E.^, Douglas, A.,* & Rittle-Johnson, B. (2020). Finding patterns in objects and numbers: Repeating patterning in pre-K predicts kindergarten mathematics knowledge. *Journal of Experimental Child Psychology,* 200, https://doi.org/10.1016/j.jecp.2020.104965

Zippert, E.^, Douglas, A.,* & Rittle-Johnson, B. (2020) Preschoolers' broad mathematics experiences with parents during play. *Journal of Experimental Child Psychology,* 192. doi: 10.1016/j.jecp.2019.104757

Douglas, A.*, Zippert, E.^, & Rittle-Johnson, B. (2019) Parent-Child Talk about Early Numeracy: The Role of Context and Parents' Math Beliefs. *Iris Journal of Scholarship, 1,* 48-68. https://doi.org/10.15695/iris.v1i0.4659

Fyfe, E.*, Rittle-Johnson, B., & Farran, D. (2019). Predicting success on high-stakes math tests from preschool math measures among children from low-income homes. *Journal of Educational Psychology. 111*(3), 402-413. dx.doi.org/10.1037/edu0000298

Rittle-Johnson, B, Zippert, E. L. ^, Boice, K. L.* (2019). The Roles of Patterning and Spatial Skills in Early Mathematics Development. *Early Childhood Research Quarterly, 46,* pp. 166-178. DOI 10.1016/j.ecresq.2018.03.006

Zippert, E.,^ Clayback, K.* & Rittle-Johnson, B. (2019). Not Just IQ: Patterning Predicts Preschoolers' Math Knowledge Beyond Fluid Reasoning. *Journal of Cognition and Development, 20,* 752-771. *doi: 10.1080/15248372.2019.1658587*

Zippert, E. ^ & Rittle-Johnson, B. (2019). The home math environment: More than numeracy. *Early Childhood Research Quarterly*. *50*, pp. 4-15. DOI 10.1016/j.ecresq.2018.07.009

Rittle-Johnson, B, Zippert, E. L. ^, Boice, K. L.* (2018). Data on preschool children's math, patterning, and spatial knowledge. *Data in Brief*, *20,* pp. 196-199. DOI 10.1016/j.dib.2018.07.061

Gresalfi, M., Rittle-Johnson, B., Loehr, A.* & Nichols, I.* (2018). Design matters: Explorations of Content and Design in Fraction Games. *Educational Technology Research and Development, 66,* 579–596. DOI: 10.1007/s11423-017-9557-7.

Chu, J.,* Rittle-Johnson, B., & Fyfe, E.* (2017). Diagrams benefit symbolic problem solving. *British Journal of Educational Psychology, 87*, 273-287. DOI: 10.1111/bjep.12149.

Durkin, K., Rittle-Johnson, B., & Star, J. (2017). Using comparison of multiple strategies in the mathematics classroom: Lessons learned and next steps. *ZDM Mathematics Education*, *49*, 585-598. DOI 10.1007/s11858-017-0853-9.

Fyfe, E.* & Rittle-Johnson, B. (2017). Mathematics practice without feedback: A desirable difficulty in a classroom setting. *Instructional Science, 45*, 177-184. 10.1007/s11251-016-9401-1.

Loehr, A.* & Rittle-Johnson, B. (2017). Putting the "th" in tenths: Providing place value labels helps reveal the structure of our base-10 numeral system. *Journal of Cognition and Development, 81*, 226 - 245. DOI: 10.1080/15248372.2016.1243118

Rittle-Johnson, B. (2017). Developing mathematics knowledge. *Child Development Perspectives, 11,* 184-190. DOI: 10.1111/cdep.12229

Rittle-Johnson, B. Fyfe, E.,* Hofer, K. & Farran, D. (2017). Early Math Trajectories: Low-Income Children's Mathematics Knowledge from Age 4 to 11. *Child Development, 88,* 1727-1742. DOI: 10.1111/cdev.12662.

Rittle-Johnson, B., & Loehr, A.* (2017). Eliciting Explanations: Constraints on when self-explanation aids learning. *Psychonomic Bulletin & Review, 24,* 1501-1510. DOI 10.3758/s13423-016-1079-5.

Rittle-Johnson, B., Loehr* A., & Durkin, K. (2017). Promoting self-explanation to improve mathematics learning: A meta-analysis and instructional design principles. *ZDM Mathematics Education, 49*, 599-611. DOI 10.1007/s11858-017-0834-z.

Rittle-Johnson, B. Fyfe, E.,* & Loehr, A.* (2016). The Content of Instruction Within A Mathematics Lesson: Implications for Conceptual and Procedural Knowledge Development. *British Journal of Educational Psychology, 86,* 576 - 591. DOI:10.1111/bjep.12124

Star, J.R., Rittle-Johnson, B., & Durkin, K. (2016). Comparison and explanation of multiple strategies: One example of a small step forward for improving mathematics education. *Policy Insights from the Behavioral and Brain Sciences, 3*(2), 151-159. doi: 10.1177/2372732216655543.

Fyfe, E. R.* & Rittle-Johnson, B. (2016). The benefits of computer-generated feedback for mathematics problem solving. *Journal of Experimental Child Psychology,* 147, 140-151. doi: 10.1016/j.jecp.2016.03.009.

Fyfe, E. R.* & Rittle-Johnson, B. (2016). Feedback both helps and hinders learning: The causal role of prior knowledge. *Journal of Educational Psychology,* 108(1), 82 – 97. doi: 10.1037/edu0000053

Miller, M.R. ^ , Rittle-Johnson, B., Loehr, A. M.* & Fyfe, E. R.* (2016). The influence of relational knowledge and executive function on preschoolers' repeating pattern knowledge. *Journal of Cognition and Development. 17*, 85-104*,* DOI 10.1080/15248372.2015.1023307

DeCaro, D., DeCaro, M.S.^, & Rittle-Johnson, B. (2015). Achievement motivation and knowledge development during exploratory learning. *Learning and Individual Differences, 37,* pp. 15-26. DOI 10.1016/j.lindif.2014.10.015*.*

Fyfe, E. R.*, DeCaro, M. S.^ & Rittle-Johnson, B. (2015).When feedback is cognitively-demaning: The importance of working memory capacity. *Instructional Science,* 43, pp. 73 – 91. 10.1007/s11251-014-9323-8.

Fyfe, E. R.*, McNeil, N. M. & Rittle-Johnson, B (2015). Easy as ABCABC: Abstract language facilitates performance on a concrete patterning task. *Child Development*. DOI 10.1111/cdev.12331

Rittle-Johnson, B., Fyfe, E. R.* Loehr, A. M.* & Miller, M.R. ^ (2015). Beyond numeracy in preschool: Adding patterns to the equation. *Early Childhood Research Quarterly, 31,* pp. 101-112*.* DOI 10.1016/j.ecresq.2015.01.005

Rittle-Johnson, B. Schneider, M. & Star, J. (2015). Not a one-way street: Bi-directional relations between procedural and conceptual knowledge of mathematics. *Educational Psychology Review, 27,* pp. 587-597. DOI 10.1007/s10648-015-9302-x

Star, J.R., Newton, K., Pollack, C.,* Kokka, K.*, Rittle-Johnson, B., & Durkin, K.^ (2015). Student, teacher, and instructional characteristics related to students' gains in flexibility. *Contemporary Educational Psychology, 41,* pp. 198-208. DOI 10.1016/j.cedpsych.2015.03.001

Durkin, K.* & Rittle-Johnson, B. (2014). Diagnosing misconceptions: Revealing changing decimal fraction knowledge. *Learning and Instruction*. DOI 10.1016/j.learninstruc.2014.08.003

Fyfe, E. R.*, DeCaro, M. S.^ & Rittle-Johnson, B. (2014). An alternative time for telling: When conceptual instruction prior to exploration improves mathematical knowledge. *British Journal of Educational Psychology, 84*, pp. 502-519. doi: 10.1111/bjep.12035

Loehr, A. M.,* Fyfe, E. R.*, & Rittle-Johnson, B. (2014). Wait for it… Delaying instruction improves mathematics problem solving: A classroom study. *The Journal of Problem Solving*, *7,* pp. 36 – 49. Doi: 10.7771/1932-6246.1166

Star, J.R., Pollack, C.*, Durkin, K.*, Rittle-Johnson, B., Lynch, K.*, Newton, K., & Gogolen, C.* (2014) Learning from comparison in algebra. *Contemporary Educational Psychology.* DOI 10.1016/j.cedpsych.2014.05.005

Adams, D.*, McLaren, B. M., Durkin, K., Mayer, R.E., Rittle-Johnson, B., Isotani, S., & Van Velsen, M. (2014). Using erroneous examples to improve mathematics learning with a web-based tutoring system. *Computers in Human Behavior, 36*, pp. 401-411. DOI 10.1016/j.chb.2014.03.053.

McEldoon, K.*, Durkin, K.*, & Rittle-Johnson, B. (2013). Is self-explanation worth the time? A comparison to additional practice. *British Journal of Educational Psychology.* 83(4), pp. 615-632. DOI: 10.1111/j.2044-8279.2012.02083.x

Rittle-Johnson, B., Fyfe, E. R.*, McLean, L. E.*, McEldoon, K. L.*, (2013). Emerging understanding of patterning in four-year-olds. *Journal of Cognition and Development*. 14(3), pp. 375-395. DOI: 10.1080/15248372.2012.689897

DeCaro, M. S.^ & Rittle-Johnson, B. (2012). Solving math problems prepares students to learn from instruction. *Journal of Experimental Child Psychology.* 113(4), pp. 552-568. doi 10.1016/j.jecp.2012.06.009

Durkin, K.* & Rittle-Johnson, B. (2012). The effectiveness of using incorrect examples to support learning about decimal magnitude. *Learning and Instruction*, 22(3), pp. 206-214. doi:10.1016/j.learninstruc.2011.11.001

Fyfe, E. R.*, Rittle-Johnson, B. & DeCaro, M. S.^ (2012). The effects of feedback during exploratory mathematics problem solving: Prior knowledge matters. *Journal of Educational Psychology*, 104(4), pp. 1094-1108. doi: 10.1037/a0028389

Matthews, P. G.*, Rittle-Johnson, B., McEldoon, K.* & Taylor, R. S.^ (2012). Measure for measure: What combining diverse measures reveals about children's understanding of the equal sign as an indicator of mathematical equality. *Journal for Research in Mathematics Education*, *43*(3), p. 316-350.

Rittle-Johnson, B., Star, J., & Durkin, K.* (2012). Developing procedural flexibility: Are novices prepared to learn from comparing procedures? *British Journal of Educational Psychology*. 82, 436-455. DOI:10.1111/j.2044-8279.2011.02037.x.

Schneider, M., Rittle-Johnson, B., & Star, J. (2011). Relations between conceptual knowledge, procedural knowledge, and procedural flexibility in two samples differing in prior knowledge. *Developmental Psychology*. 47(6), 1525–1538. doi: 10.1037/a0024997

Rittle-Johnson, B., Matthews, P.G.*, Taylor, R.^ & McEldoon, K.* (2011). Assessing Knowledge of Mathematical Equivalence: A Construct Modeling Approach. *Journal of Educational Psychology*, 103 (1), 85-104. DOI: 10.1037/a0021334

McNeil, N. M., Rittle-Johnson, B., Hattikudur, S.* & Peterson, L. A.* (2010). Continuity in representation between children and adults: Arithmetic knowledge hinders undergraduates' algebraic problem solving. *Journal of Cognition and Development, 11(4),* 437-457.

Star, J. R. Kenyon, M.*, Joiner, R.* & Rittle-Johnson, B. (2010). Comparing pays off! *Mathematics Teacher, 103 (8)*, 608 – 612.

Star, J. R., Kenyon, M.*, Joiner, R.* & Rittle-Johnson, B. (2010). Comparison helps students learn to be better estimators. *Teaching Children Mathematics, 16(9),* 557-559.

Matthews, P. G.* & Rittle-Johnson, B. (2009). In pursuit of knowledge: Comparing self-explanations, concepts, and procedures as pedagogical tools. *Journal of Experimental Child Psychology*, *104*, 1-21.

Rittle-Johnson, B. & Koedinger, K.R. (2009). Iterating between lessons on concepts and procedures can improve mathematics knowledge. *British Journal of Educational Psychology*, *79*, 483 – 500.

Rittle-Johnson, B. & Star, J. (2009). Compared to what? The effects of different comparisons on conceptual knowledge and procedural flexibility for equation solving. *Journal of Educational Psychology, 101(3)*, 529-544.

Rittle-Johnson, B., Star, J. & Durkin, K.* (2009). The importance of prior knowledge when comparing examples: Influences on conceptual and procedural knowledge of

equation solving. *Journal of Educational Psychology*, *101 (4)*, 836-852. DOI: 10.1037/a0016026

Star, J. R. & Rittle-Johnson, B. (2009). It pays to compare: An experimental study on computational estimation. *Journal of Experimental Child Psychology, 101*, 408-426.

Star, J. R., & Rittle-Johnson, B. (2009). Making algebra work: Instructional strategies that deepen student understanding, within and between algebraic representations. *ERS Spectrum*, *27* (2), 11-18.

Star, J. R., Rittle-Johnson, B., Lynch, K.* & Perova, N.* (2009). The role of prior knowledge in the development of strategy flexibility: The case of computational estimation. *ZDM – The International Journal on Mathematics Education*, *41*, 569-579.

Rittle-Johnson, B. & Kmicikewycz, A. O.* (2008). When generating answers benefits arithmetic skill: The importance of prior knowledge. *Journal of Experimental Child Psychology*, *101*, 75-81.

Rittle-Johnson, B, Saylor, M. & Swygart, K.* (2008). Learning from explaining: Does it matter if mom is listening? *Journal of Experimental Child Psychology*, *100*(3), 215-224.

Star, J. & Rittle-Johnson, B. (2008). Flexibility in problem solving: The case of equation solving. *Learning and Instruction*, *18*, 565-579.

Rittle-Johnson, B. & Star, J. (2007). Does comparing solution methods facilitate conceptual and procedural knowledge? An experimental study on learning to solve equations. *Journal of Educational Psychology*. *99*(3), 561-574.

Rittle-Johnson, B. (2006). Promoting transfer: Effects of self-explanation and direct instruction. *Child Development, 7(1),* 1-15.

Rittle-Johnson, B. & Koedinger, K.R. (2005). Designing knowledge scaffolds to support mathematical problem solving. *Cognition and Instruction*, *23*(3), 313-349.

Rittle-Johnson, B., Siegler, R.S. & Alibali, M.W. (2001). Developing conceptual understanding and procedural skill in mathematics: An iterative process. *Journal of Educational Psychology, 93,* 346-362.

Rittle-Johnson, B. & Alibali, M.W. (1999). Conceptual and procedural knowledge of mathematics: Does one lead to the other? *Journal of Educational Psychology*, *91*, 1-16.

Rittle-Johnson, B. & Siegler, R.S. (1999). Learning to spell: Variability, choice, and change in children's strategy use. *Child Development, 70,* 332-348.

MANUSCRIPTS UNDER REVIEW or IN REVISION

Ban, J.*, Msall, C.,* Douglas, A.^, Rittle-Johnson, B., Laski, E. (under review). Knowing What They Know: Preschool Teachers' Knowledge of Math Skills Preschoolers' Know and its Relation to Their Instruction.

Douglas, A.*, Rittle-Johnson, B., Adler, R.*, Mendez, A.*, Haymond, C., Brandon, J.*, & Durkin, K. (under review). "He's probably the only teacher I've actually learned from": Marginalized Students' Experiences and Views of High School Mathematics. (4th round of revisions for American Education Research Journal)

Kaufman, J.* & Rittle-Johnson, B. (under revision). Expanding understanding of number: The development of ordinality knowledge.

Rittle-Johnson, B. Adler, R.* & Durkin, K. (under review). Predicting marginalized students' mathematics achievement in high school.

CONFERENCE PROCEEDINGS (Peer Reviewed)

Star, J., Rittle-Johnson, B., Durkin, K., Shero, M., & Sommer, J. (2020). Teaching for Improved Procedural Flexibility in Mathematics. In Gresalfi, M. and Horn, I. S. (Eds.), The Interdisciplinarity of the Learning Sciences, 14th International Conference of the Learning Sciences (ICLS) 2020, Volume 4 (pp. 2285-2288). Nashville, Tennessee: International Society of the Learning Sciences.
https://repository.isls.org//handle/1/6533

Rittle-Johnson, B. Star, J., Durkin, K. & Loehr, A. (2018, May). Comparing solution strategies to promote algebra learning and flexibility. In Hsieh, F. & Kaur, B. (Eds) *Proceedings of the 8th ICMI-East Asia Regional Conference on Mathematics Education*, Volume 1. Taipei, Taiwan: National Taiwan Normal University.

Fyfe, E. R.,* & Rittle-Johnson, B. (2016, November). Longitudinal predictions of sixth-grade geometry knowledge. In Wood, M.B. et al (Eds), *Proceedings of the 38th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Tucson, AR: University of Arizona.

Hong, M. K.*, Yeo, D. J.*, Rittle-Johnson, B., Fazio, L. K. (2016, August). Are There Hidden Costs to Teaching with Incorrect Examples? In Grodner, D. et al. (Eds.), *Proceedings of 38th Annual Meeting of the Cognitive Science Society*. Austin, TX: Cognitive Science Society.

Loehr, A.*, & Rittle-Johnson, B. (2016, August). Putting the "th" in Tenths: The Role of Labeling Decimals in Revealing Place Value Structure. In Grodner, D. et al. (Eds.), *Proceedings of 38th Annual Meeting of the Cognitive Science Society*. Austin, TX: Cognitive Science Society.

Chu, J.*, Fyfe, E.* & Rittle-Johnson, B. (2015, July). Diagrams benefit symbolic problem solving. In Noelle, D. C., Dale, R., Warlaumont, A. S., Yoshimi, J., Matlock, T., Jennings, C. D., & Maglio, P. P. (Eds.), *Proceedings of 37th Annual Meeting of the Cognitive Science Society*. (pp. 381-386). Austin, TX: Cognitive Science Society.

DeCaro, D., DeCaro, M.S., & Rittle-Johnson, B. (2013, August). Achievement Motivation and Strategy Selection during Exploratory Learning. In M. Knauff, M. Pauen, N. Sebanz, & I. Wachsmuth (Eds.), *Proceedings of 35th Annual Meeting of the Cognitive Science Society. (*pp. 370-375). Austin, TX: Cognitive Science Society.

Fyfe, E. R., & Rittle-Johnson, B. (2012, August). The effects of feedback during exploration depend on prior knowledge. In N. Miyake, D. Peebles, & R. P. Cooper (Eds.), *Proceedings of the 34th Annual Conference of the Cognitive Science Society* (pp. 348-354). Sapporo, Japan: Cognitive Science Society.

Isotani, S., Adams, D, Mayer, R. E., Durkin, K., Rittle-Johnson, B., and McLaren, B. (2011). Can erroneous examples help middle-school students learn decimals? *Proceedings of the European Conference on Technology Enhanced Learning.*

McEldoon, K. & Rittle-Johnson, B. (2010, October). Assessing Elementary Students' Functional Thinking Skills: The Case of Function Tables. *Proceedings of the 2010 annual meeting of the North American Chapters of the International Group for the Psychology of Mathematics Education*. Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education.

Rittle-Johnson, B., Matthews, P., Taylor, R. & McEldoon, K. (2010, October). Assessing Knowledge of Mathematical Equivalence: A Construct Modeling Approach. *Proceedings of the 2010 annual meeting of the North American Chapters of the*

International Group for the Psychology of Mathematics Education. Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education.

DeCaro, M. & Rittle-Johnson, B. (2010, August). The Capacity to Discover: Working Memory and the Ability to Use Self-Explanation to Discover Early Algebra Concepts. In S. Ohlsson & R. Catrambone (Eds.) *Cognition in Flux: Proceedings of the 32nd Annual Meeting of the Cognitive Science Society* (p. 536). Austin, TX: Cognitive Science Society.

Durkin, K., Rittle-Johnson, B. & Star, J. R. (2010, August). Immediate Introduction to Multiple Procedures Supports Procedural Flexibility in Equation Solving. In S. Ohlsson & R. Catrambone (Eds.) *Cognition in Flux: Proceedings of the 32nd Annual Meeting of the Cognitive Science Society* (p. 638). Austin, TX: Cognitive Science Society.

McEldoon, K., Cochrane-Braswell, Caroline, & Rittle-Johnson, B. (2010, August). Effects of Problem Context on Strategy Use within Functional Thinking. In S. Ohlsson & R. Catrambone (Eds.) *Cognition in Flux: Proceedings of the 32nd Annual Meeting of the Cognitive Science Society* (pp. 145-149). Austin, TX: Cognitive Science Society.

Star, J. & Rittle-Johnson, B. (2009, September). The role of prior knowledge in the development of strategy flexibility: The case of computational estimation. *Proceedings of the 2009 annual meeting of the North American Chapters of the International Group for the Psychology of Mathematics Education*. Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education.

Rittle-Johnson, B. & Star, J. (2007, August). Compared to what? How different types of comparison facilitate transfer in mathematics. Part of the symposium "Fostering transfer of knowledge in education settings." In D. S. McNamara & G. Trafton (Eds.), *Proceedings of the 29th Meeting of the Cognitive Science Society*. (pp. 21-22). Austin, TX; Cognitive Science Society.

Matthews, P., & Rittle-Johnson, B. (2007, August). To teach by concept or by procedure? Making the most of self-explanations. In D. S. McNamara & G. Trafton (Eds.), *Proceedings of the 29th Meeting of the Cognitive Science Society*. (pp. 1283-1288). Austin, TX; Cognitive Science Society.

Rittle-Johnson, B. (2005, August). Promoting flexible problem-solving: The effects of direct instruction and self-explaining. In K. Forbus, D. Genter & T. Regier (Eds.),

Proceedings of the Twenty-Sixth Annual Conference of the Cognitive Science Society (pp. 1161-1166). Mahwah, NJ: Erlbaum.

Rittle-Johnson, B. & Koedinger, K. (2002, October). Comparing instructional strategies for integrating conceptual and procedural knowledge. In Mewborn, D.S., Sztajin, P., White, D.Y., Wiegel, H.G., Bryant, R.L. & Nooney, K. (Ed.) *Proceedings of the twenty-fourth annual meeting of the North American Chapters of the International Group for the Psychology of Mathematics Education*. Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education, (pp. 969-978)

Rittle-Johnson, B., Kalchman, M., Czarnocha, B., & Baker, W. (2002, October). An integrated approach to the procedural/conceptual debate. In Mewborn, D.S., Sztajin, P., White, D.Y., Wiegel, H.G., Bryant, R.L. & Nooney, K. (Ed.) *Proceedings of the twenty-fourth annual meeting of the North American Chapters of the International Group for the Psychology of Mathematics Education*. Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education, (pp. 167-180).

Rittle-Johnson, B. & Koedinger, K. (2001, August). Using cognitive models to guide instructional design: The case of fraction division. In J. Moore & K. Stenning (Ed.), *Proceedings of the 23rd Annual Conference of the Cognitive Science Society,* (pp. 857-862). Mahwah, NJ, Erlbaum.

CURRICULA

Clark, E., Koedinger, K.R. & Rittle-Johnson, B. (2002). *Cognitive Tutor Math 6.* Carnegie Learning Co., Pittsburgh, PA. (Intelligent tutoring component that I authored is now being made available on the web. See https://mathtutor.web.cmu.edu/

INVITED PRESENTATIONS

Invited Colloquium Presentations

2024, March. Kyoto University Graduate School of Education
2024, February. University of Tokyo Graduate School of Education
2021, February. Emory University, Mechanisms of Learning series
2020, March. University of Chicago, Education Workshop series
2019, October. Northwestern University Cognitive Science talk series.
2019, February. University of Virginia, Curry Education Research Lectureship Series
2017, May. University of Delaware, College of Education and Human Development Colloquium

2017, March. Temple University, Temple Institute for Learning and Education Sciences (TILES) seminar series
2014, November. Carnegie Mellon University, Program in Interdisciplinary Education Research
2014, November. University of Louisville, Department of Psychological and Brain Sciences
2013, November. Indiana University, Cognitive Science Colloquium Series

Keynote and Invited Conference Presentations

Rittle-Johnson, B. (2017, October). Do you notice a pattern? Patterning, relational reasoning and mathematics knowledge. Presidential invited symposium. Cognitive Development Society Biennial Meeting, Portland, OR.

Rittle-Johnson, B. (2015, May). The power of comparison in learning and instruction: Experimental evidence from mathematics classrooms. Invited speaker at 2015 Math Cognition Conference, hosted at University of Missouri, St. Louis (with funding from NIH).

Rittle-Johnson, B. (2015, March). The power of comparison in learning and instruction: Experimental evidence from mathematics classrooms. Invited speaker at the 5th Latin American School for Education, Cognitive and Neural Sciences. Organized by the James S. McDonnell Foundation and Pontificia Universidad Católica de Chile.

Rittle-Johnson, B. (2014, October). The power of comparison in learning and instruction: Experimental evidence from mathematics classrooms. Invited speaker at Improving Student Achievement: A Summit on Learning and Education, hosted at Kent State University.

Rittle-Johnson, B. (2013, July). The Value of Problem Exploration: When Struggling to Solve Unfamiliar Problems Prepares Children to Learn from Mathematics Instruction. Keynote talk at the 2013 Midwest Meeting on Mathematical Thinking.

Rittle-Johnson, B. (2012, August). Overcoming Misconceptions: Insights from Research on Understanding the Equal Sign. Keynote talk at the International Conference on Conceptual Change, Trier, Germany.

Rittle-Johnson, B. (2008, November). Mathematical problem solving: Bridging between cognitive science and education. Invited presentation at Problem Solving Workshop, sponsored by Purdue University and U.S. Air Force.

Rittle-Johnson, B. & Star, J. (2008, June). It pays to compare: Effectively using comparison to support student learning of algebra. Invited talk for the Institute for Education Sciences Research Conference, Washington, D.C.

Star, J. & Rittle-Johnson, B. (2007, August). Contrasting cases in mathematics lessons support procedural flexibility. Invited talk presented at the 12th Biennial conference of the European Association for Research on Learning and Instruction (EARLI), Budapest, Hungary.

RESEARCH GRANTS

Current

Principal Investigator, with Scott Crossley and Kelley Durkin (co-PIs). "Math Misconceptions Data Challenge with IES." Bill and Melinda Gates Foundation. 9/15/23 – 9/14/25. $1,210,000.

Principal Investigator, with Scott Crossley and Kelley Durkin (co-PIs). "IES Data Science Challenge Partnership." Schmidt Futures. 10/1/2023 – 7/2025. $500,000.

Investigator, with Cristina Zepeda, PI, "Investigating the Impact of Metacognitive Supports on Students' Mathematics Knowledge and Motivation in MATHia." U.S. Dept. of Education Institute of Education Science, 01/01/24 - 12/31/25. $399,960.

Co-Principal Investigator, with Kelley Durkin, PI, "Understanding How MNPS's 5 Tiered Intervention Platforms Are Working to Improve Students' Literacy and Numeracy." Nashville Partnership for Educational Equity Research (PEER). 5/16/23 – 12/30/23, $10,000.

Principal Investigator, Ashli-Ann Douglas (co-PI). "Helping Parents Help Their Children: Supports for Early Patterning and Numeracy Development." Heising-Simons Foundation. 5/1/21 – 6/30/24, $364,392 + $76,423 supplement.

Completed

Co-Principal Investigator, with Kelley Durkin, PI, "A Longitudinal Study Predicting Postsecondary STEM Readiness Among Low-Income Minority Students," EHR Core, National Science Foundation, 08/2018 - 07/2022, $1,499,997 + REU supplement.

Principal Investigator, "Exploring the roles of pattern and spatial skills in early mathematics development," U.S. Dept. of Education Institute of Education Sciences, 7/1/2016 – 3/31/21, $937,582.

Principle Investigator with Jon Star (PI, Harvard University) and Kelley Durkin (Investigator), "Collaborative Proposal: Leveraging Comparison and Explanation of Multiple Strategies (CEMS) to Improve Algebra Learning," National Science Foundation EHR Core, 7/1/2016 – 9/30/20, $570,082 (to VU).

Co-Principal Investigator, with Maithilee Kunda (PI), "CompCog: Collaborative Research: Learning Visuospatial Reasoning Skills from Experience," National Science Foundation Science of Learning, 8/15/2017 – 7/31/2020, $200,000.

Principal Investigator, Erica Zippert (co-PI), "Putting it all together: Developing a more comprehensive theory of early mathematics development," Heising-Simons Foundation, 8/1/16 – 7/31/19, $134,344.

Investigator with Dale Farran (PI), Kerry Hofer (co-PI), Bruce McCandliss and Gavin Price "Contributions to Mathematics Competency of At-Risk Students: The Impact of Executive Function, Approximate Number System and Early Mathematics Skills," U.S. Dept. of Education Institute of Education Sciences, 7/2014 – 6/2018. $1,599,382.

Investigator with Dale Farran (PI), Kerry Hofer (co-PI), Bruce McCandliss and Gavin Price "Middle School Mathematics Competencies in At-Risk Students, a Longitudinal Investigation from Early Childhood," Heising-Simons Foundation, 10/2013 – 9/2015, $625,000.

Principal Investigator, "Which is Correct? Effectiveness of Comparing Correct and Incorrect Solutions for Fraction Learning" Peabody Small Research Grant, 5/2012-4/2013, $6800.

Principal Investigator, "CAREER: Developing conceptual and procedural knowledge: The roles of self- and instructional explanations," National Science Foundation Faculty Early Career Development Program, 7/2008 – 6/2014. $567,000.
*Grant was selected in 2014 by NSF as one of nine REESE-competition grants for a case study because of the exemplary involvement of junior researchers and publication productivity.

Co-Principal Investigator with Jon Star (PI) and Kristie Newton. "Helping teachers to use and students to learn from contrasting examples: A scale-up study in Algebra I"

National Science Foundation Research & Evaluation on Education in Science & Engineering (REESE), 10/2008 – 9/ 2014, $1,999,987 ($171, 508 to Vanderbilt).

Co-Principal Investigator with Paul Cobb (PI), Guatam Biswas and Thomas Smith. "Postdoctoral Training: Rigorous Research Methods in the Learning Sciences" U.S. Dept. of Education Institute of Education Sciences, 6/08 – 11/13. $864,447.

Co-Principal Investigator with Jon Star. "Using contrasting examples to support procedural flexibility and conceptual understanding in mathematics" U.S. Dept. of Education Institute of Education Sciences, 8/05 - 8/09. $1,014,175 ($560,566 to Vanderbilt).

Principal Investigator, "Validating measures of conceptual and procedural knowledge of mathematical equivalence" Peabody Small Research Grant, 1/08-12/08, $6900.

Principal Investigator, "Promoting integration of conceptual and procedural knowledge in mathematics: The effects of students inventing procedures and self-explaining" Peabody Small Research Grant, 6/03-5/04. $6850.

CONFERENCE PRESENTATIONS (past 10 years)

* student (graduate or undergraduate); ^post-doc

Adler, R.*, Douglas, A. A.^, Dukin, K. & Rittle-Johnson, B. (2024, April). "You need to know basic math": Marginalized students question the usefulness of advanced mathematics. Paper presented at the annual meeting of the American Educational Research Association, Philadelphia, PA

Douglas, A. A.^, Msall, C.*, Logan, F.*, & Rittle-Johnson, B. (2024, April). The effect of a brief information-based intervention on the home math environment. In C. Msall (Chair). Broadening our understanding of early math support at home and at school. Paper presented at the annual meeting of the American Educational Research Association, Philadelphia, PA.

Msall, C.*, Douglas, A. A.^, & Rittle-Johnson, B. (2024, April). Investigating the Role of parents' knowledge of early math skills and home math support. In C. Msall (Chair). Broadening our understanding of early math support at home and at school. Paper presented at the annual meeting of the American Educational Research Association, Philadelphia, PA.

Yildirim, B. F., Pesen, M., Ozgunlu, M. Karmaz, B. S., Seker, V., Msall, C., Ozel, Rittle-Johnson, B. (2024, April). Visual Support and Pattern Knowledge: A Study on Preschool Children in the US and Turkey. Poster presented at the annual meeting of the American Educational Research Association, Philadelphia, PA.

Poston, B.*, Msall, C.*, Douglas, A-A.^, Rittle-Johnson, B. (2024, January). *Parent's early home math support does not correlate between survey and interview responses.* Poster to be presented at the annual Southeastern STEM Education Research Conference, Murfreesboro, TN, United States.

Richmond, A.*, Msall, C.*, Logan, F.*, Douglas, A-A.^, Rittle-Johnson, B. (2024, January). Parental Mathematics Support Through Pattern Activities and Talk. Poster to be presented at the annual Southeastern STEM Education Research Conference, Murfreesboro, TN, United States.

Kaufman, J. & Rittle-Johnson, B. (2023, June). Exploring the Development of Children's Ordinality Knowledge. Poster presented at the Mathematical Cognition and Learning Society Annual Conference, Loughborough, UK.

Rittle-Johnson, B. & Kaufman, J. (2023, June). Developing a Patterning Lens to Improve Early Numeracy Knowledge: A Pilot Study. Poster presented at Mathematical Cognition and Learning Society Annual Conference, Loughborough, UK.

Adler, R.* Rittle-Johnson, B. Hickendorff, M., Durkin, K. (2023, May). Profiles of math and science motivation among marganilized students and relation to STEM outcomes. Paper presentation for the American Educational Research Association (AERA) Annual Conference, Virtual.

Adler, R.*, Xu, M.*, & Rittle-Johnson, B. (2023, April). What Counts as STEM Careers Matters: Gender and Motivational Predictors Vary by Definition. Paper presentation for the American Educational Research Association (AERA) Annual Conference, Chicago, IL.

Rittle-Johnson, B., Adler, R.*, & Durkin, K. (2023, April). Readiness for College Mathematics: Longitudinal Predictors Among Marginalized Students. Paper presentation for the American Educational Research Association (AERA) Annual Conference, Chicago, IL.

Douglas, A. A.*, Msall, C.*, & Rittle-Johnson, B. (2022, June), Parents' numeracy support during informal versus formal contexts: Fathers report more informal engagement

than mothers. Paper presented at the Math Cognition and Learning Society Conference, Antwerp, Belgium.

Msall, C.*, Douglas, A. A.*, & Rittle-Johnson, B. (2022, June), Parents' approaches to early numeracy support do not match the approach they think is most important. Poster presented at the annual meeting of the Math Cognition and Learning Society, Antwerp, Belgium.

Méndez-Fernández, A.*, Adler, R.*, Douglas, A.*, & Rittle-Johnson, B. (2022, May). Marginalized Students' Exposure to Inclusive Pedagogy. Poster presented at the Society for Research in Child Development Special Topics Meeting: Construction of the 'Other': Development, Consequences, and Applied Implications of Racism, Prejudice and Discrimination (Rio Grande, Puerto Rico).

Douglas, A.*, Adler, R.M.*, & Rittle-Johnson, B. (2022, April). "We are going to be stranded": Marginalized high school students' beliefs about math. Paper presented at the Cognitive Development Society Biennial meeting (Madison, WI).

Msall, C.* Klinnberg, J.E.* & Rittle-Johnson, B. (2022, April). Helping children see patterns: Visual support as a tool for understanding repeating patterns. Poster presented at the Cognitive Development Society Biennial meeting (Madison, WI).

Rohila, A.* Adler, R.,* & Rittle-Johnson, B. (2022, April). "Me, myself, and I:" An analysis of underrepresented students' perspectives on their postsecondary trajectories. Poster presented at the Cognitive Development Society Biennial meeting (Madison, WI).

Adler, R.M.*, & Rittle-Johnson, B. (2022, April). Predicting math achievement and STEM career interest among Black students: Limitations of expectancy-value theory. Paper presentation for the American Educational Research Association (AERA) Annual Conference (San Diego, CA).

Douglas, A.*, Zippert, E.^, Rittle-Johnson, B. (2022, February). Parents' early numeracy support: Considering the nature and role of their beliefs. In Zippert, E. (Chair). Zooming in on caregivers' mathematics beliefs. Paper presented at the weekly meeting of the *Mathematical Cognition and Learning Society.*

Kaufman, J.*, Douglas, A.*, Msall, C.*, Özel, S., & Rittle-Johnson, B. (September, 2021). Measuring Preschoolers' and Kindergarteners' Understanding of Different Types of Patterns. Poster presented at the annual meeting of the Society for Research on Educational Effectiveness, Virtual Conference.

Douglas, A.,* Harmon, M. Joseph, N. & Rittle-Johnson, B. (2021, April). "I'm scared to ask for help": Black Girls' Voicing of their K-12 Math Experiences. Poster presentation for the Society for Research in Child Development (SRCD) Conference (on-line).

Douglas, A.*, Kaufman, J. & Rittle-Johnson, B. (2021, April). Kindergarteners' Understanding of Different Types of Patterns. Poster presentation for the Society for Research in Child Development (SRCD) Conference (on-line).

Rittle-Johnson, B., Fujimura, N., Goto, S., Aoyagi, Y., Star, J., Durkin, K., & Loehr, A. (2021, April). Building Algebraic Knowledge and Flexibility: A Comparison of Secondary-School Students in the U.S. and Japan. Paper presentation for the American Educational Research Association Annual Conference (AERA; on-line).

Rittle-Johnson, Durkin, K. & Farran, D. (2021, April). Marginalized Students' Opportunities to Learn in Integrated Mathematics Courses. Paper presentation for the American Educational Research Association Annual Conference (AERA; on-line).

Zippert, E. Douglas, A., Rittle-Johnson (2021, April). Emphasizing the Numbers in Patterns During Training, Effects on Patterning and Math Skills. Paper presentation for the Society for Research in Child Development Conference (SRCD; on-line).

Douglas, A.*, Zippert, E.^ & Rittle-Johnson (2020, April). The Impact of Information, Context, and Child Gender on Parents' Early Numeracy Input. Paper presentation for the American Educational Research Association Annual Conference (AERA), San Francisco, CA.

Douglas, A.*, Zippert, E.^ & Rittle-Johnson (2020, April). Measuring Preschoolers' Geometry Knowledge. Poster presentation for the American Educational Research Association Annual Conference (AERA), San Francisco, CA.

Joseph, N. & Rittle-Johnson, B. (2020, April). Black Girls' Perspectives of Instructional Strategies in Urban Middle-School Mathematics Classrooms. Paper presentation for the American Educational Research Association Annual Conference (AERA), San Francisco, CA.

Rittle-Johnson, B., Hickendorff, M., Star, J., Durkin, K. & Loehr, A. (2020, April). Comparing and Explaining Examples of Multiple Strategies to Promote Algebra Learning: Instructional Features that Predict Learning. Paper presentation for the

American Educational Research Association Annual Conference (AERA), San Francisco, CA.

Rittle-Johnson, B., Lachowicz, M., Durkin, K. & Farran, D. (2020, April) Early Math Trajectories Predicting Math Knowledge from Ages 11-15: A Longitudinal Investigation with Urban Youth. Poster presentation for the American Educational Research Association Annual Conference (AERA), San Francisco, CA.

Shero, M.,* Durkin, K., Rittle-Johnson, B., & Star, J. R. (2020, January). Teacher beliefs surrounding comparison in algebra instruction. Poster presented at the Tennessee STEM Education Research Conference, Cookeville, TN.

Star, J. R., Durkin, K., Rittle-Johnson, B., & Loehr, A.* (2020, June). Effects of comparing and discussing multiple strategies on students' algebra learning. In J. Y. C. Chan & J. K. Bye (Co-chairs), *Problem-solving strategy in algebra: From lab to practice.* Paper presentation for the 2020 Mathematical Learning and Cognition Society Conference (on-line).

Zippert, E., Rittle-Johnson, B. & Douglas, A.A. (2020, April) How parents and teachers can support the development of patterning knowledge in preschool. Paper presention for the American Educational Research Association Annual Conference, San Francisco, CA. (conference cancelled)

Rittle-Johnson, B. & Zippert, E.^ (2019, November). It's a pattern! Best practices for promoting young children's patterning knowledge. Poster presented at National Association for the Education of Young Children (NAEYC) 2019 Conference, Nashville, TN.

Loehr, A.*, Rittle-Johnson, B., Durkin, K., Star, J. (2019, October). Does Calling it 'Morgan's Way' Reduce Adoption and Generalization of the Strategy? Paper presented at the Cognitive Development Society meeting. Louisville, KY.

Rittle-Johnson, B., Zippert, E.^ and Douglas, A.* (2019, October). 16 is one more than 15: The role of the successor principle in building mathematics knowledge. Paper presented at the Cognitive Development Society meeting. Louisville, KY.

Zippert, E.,^ Douglas, A.*, & Rittle-Johnson, B. (2019, October). Exploring the Link Between Patterning, Numeracy, and Math Knowledge. Poster presented at the biennial meeting of the Cognitive Development Society, Louisville, KY.

Rittle-Johnson, B. (2019, October). Compare and Discuss to deepen learning. Talk presented at the National Council of Teachers of Mathematics Regional Conference, Nashville, TN.

Shiba, S.*, Ota, E*., Fukuda, M.*, Uesaka, Y., & Rittle-Johnson, B. (2019, August). Teachers' diagnosis of students' deep understanding. Paper presented at EARLI 2019, Aachen, Germany.

Douglas, A.*, Zippert, E.^, & Rittle-Johnson, B. (2019, June). Patterns in parents' broad early math support. Poster presented at the annual meeting of the Mathematical Cognition and Learning Society, Ottowa, Canada.

Zippert, E.^, Douglas, A.* & Rittle-Johnson, B. (2019, May). Numbers and patterns and space, oh my! Preschoolers and Parents Explore Math Broadly. Paper presented at the Association for Psychological Science (APS) Annual Conference, Washington, DC.

Loehr, A. M.*, Durkin, K., Rittle-Johnson, B., Star, J. R. (2019, April). Impact of comparison and explanation of multiple strategies on learning and flexibility in algebra. Paper presented at the American Educational Research Association (AERA) annual meeting, Toronto, Canada.

Douglas, A.*, Zippert, E. ^ & Rittle-Johnson, B. (2019, March). Supporting Early Numeracy Development with Card Games: "War" Tops The Deck. Poster presented at the Society for Research in Child Development (SRCD) Conference, Baltimore, MD.

Rittle-Johnson, B., Zippert, E.^ & Douglas, A.* (2019, March). Including Repeating Patterning Skills in Early Mathematics Education Paper presented at the Society for Research in Child Development (SRCD) Conference, Baltimore, MD.

Rittle-Johnson, B. (2019, March). Support for Relational Learning in Japanese Math Textbooks. Paper presented at the Society for Research in Child Development (SRCD) Conference, Baltimore, MD.

Zippert, E. ^ Smith, M.* & Rittle-Johnson, B. (2019, March). Parents' Broad Math Support Concurrently and Longitudinally Predicts Preschoolers' Broad Math Knowledge and Skills. Paper presented at the Society for Research in Child Development (SRCD) Conference, Baltimore, MD.

Zippert, E. ^ Clayback, K.* & Rittle-Johnson, B. (2019, March). More Than Numeracy, Patterning Predicts Early Mathematics. Paper presented at the Society for Research in Child Development (SRCD) Conference, Baltimore, MD.

Zippert, E.^, Douglas, A.*, & Rittle-Johnson, B. (2019, March). Measuring repeating patterning skill in kindergarten. Paper presented at the annual meeting of the Society for Research in Educational Effectiveness, Washington, DC.

Rittle-Johnson, B. & Zippert, E.^ (2018, October). Supporting early math knowledge through patterning. Tennessee Association for Children's Early Education, Jackson, TN. (Professional development for preschool teachers)

Zippert, E. ^ Clayback, K.* & Rittle-Johnson, B. (2018, June). More Than Just IQ: Exploring the Link Between Patterning and Individual Math Skills. Poster presented at the National Research Conference on Early Childhood, Arlington, VA.

Zhang, Y.* Fine, S.*, Loehr, A.* Star, J. & Rittle-Johnson, B. (2018, May). Procedural flexibility for algebra: Assessment development. Poster presented at the 8th East Asia Regional Conference on Mathematics Education. Taipei, Taiwan.

Durkin, K., Loehr, A. M.,* Rittle-Johnson, B., Star, J. (2018, April). Effects of encouraging comparison and explanation of multiple strategies on instructional practices in algebra classrooms. Roundtable presentation at the American Educational Research Association (AERA), New York City, NY

Loehr, A. M.*, Fazio, L. K., Rittle-Johnson, B. (2018, April). Examining the relationship between children's memory for past errors and learning. Poster presented at the American Educational Research Association (AERA), New York City, NY.

Loehr, A. M.*, Rittle-Johnson, B., Star, J. R., & Desharnais, C. (2018, April). Developing a more comprehensive measure of formal algebra knowledge. Poster presented at the American Educational Research Association (AERA), New York City, NY.

Zippert, E. ^ & Rittle-Johnson, B. (2018, April). Examining how pattern, spatial, executive function and language skills contribute to preschoolers' math knowledge. Paper presented at the annual meeting of the American Educational Research Association, New York City, New York.

Zippert, E. ^ & Rittle-Johnson, B. (2018, April). Parental support of preschoolers' number, pattern, and spatial skills predicts concurrent and later math

knowledge. Paper presented at the annual meeting of the American Educational Research Association, New York City, New York.

Rittle-Johnson, B., Fyfe, E.* & Zippert, E.^ (2017, August). Patterning Knowledge is Foundational to Mathematics Achievement. Paper presented at the 2017 conference of the European Association for Research on Learning and Instruction (EARLI), Tampere, Finland.

Rittle-Johnson, B., Loehr, A.* & Durkin, K. (2017, August). Self-Explanation Promotes Mathematics Learning: A Meta-Analysis and Its Implications for Education. Paper presented at the 2017 conference of the European Association for Research on Learning and Instruction (EARLI), Tampere, Finland.

Loehr, A.*, Rittle-Johnson, B. & Durkin, K. (2017, April). Promoting Self-Explanation to Improve Mathematics Learning: A Meta-Analysis. Poster presented at the Society for Research in Child Development Conference, Austin, Tx.

Rittle-Johnson, B. & Doydum, A. O.* (2017, April). Spatial skills predict mathematics knowledge in preschool. Paper presented at the National Council of Teachers of Mathematics Research Conference, San Antonio, Tx.

Rittle-Johnson, B. & Fyfe, E. (2017, April). Early Math Skills That Predict Low-Income Children's Mathematics Development from Age 4 to 12. Poster presented at the Society for Research in Child Development Conference, Austin, Tx.

Fyfe, E. R.* & Rittle-Johnson, B. (2016, April). When Feedback Helps versus Hurts: The Impact of Human versus Computer-Generated Feedback on Mathematics Problem Solving. Poster presented at the American Educational Research Association (AERA), Washington, DC.

Gresalfi, M., Rittle-Johnson, B., Loehr, A.* & Nichols, I.* (2016, April). Slicing and Bouncing: Can Implicit Digital Games Support Transfer to Traditional Assessments as Well as Explicit Digital Games? Paper presented at the American Educational Research Association (AERA), Washington, DC.

Rittle-Johnson, B., Fyfe, E. R., Hofer, K. & Farran, D. (2016, April). Early Math Trajectories: From Prekindergarten to Fifth Grade. Poster presented at the American Educational Research Association (AERA), Washington, DC.

Fyfe, E. R., Rittle-Johnson, B., Hofer, K. & Farran, D. (2015, October). Pattern knowledge, but not shape knowledge, predicts fifth-grade math outcomes. Poster presented at the Cognitive Development Society Biennial Meeting, Columbus, Oh.

Rittle-Johnson, B., Fyfe, E. R., Loehr, A. & Miller, M. (2015, October). It's a Pattern! The Importance of Early Pattern Knowledge for Mathematics. Paper presented in the symposium I organized "Early Math Matters: Development of Number, Shape and Pattern Knowledge in Early Childhood" at the Cognitive Development Society Biennial Meeting, Columbus, Oh.

Fyfe, E. R.*, McNeil, N. M. & Rittle-Johnson, B. (2015, March). The impact of abstract versus concrete labels on patterning performance. Poster presented at the Society for Research in Child Development Conference. Philadelphia, Pa.

Fyfe, E. R.* & Rittle-Johnson, B. (2015, March). Feedback both helps and hinders mathematics problem solving. Poster presented at the Society for Research in Child Development Conference. Philadelphia, Pa.

Fyfe, E. R.*, & Rittle-Johnson, B. (2015, March). The Timing of Feedback on Mathematics Problem Solving in a Classroom Setting. Paper presented at the Society for Research on Educational Effectiveness (SREE) Spring 2015 Conference, Washington, DC.

Rittle-Johnson, B., Fyfe, E. R.* & Loehr, A. M.* (2015, March). "Just tell me how to solve it." The impact of including procedural instruction in conjunction with conceptual instruction. Poster presented at the Society for Research in Child Development Conference. Philadelphia, Pa.

Rittle-Johnson, B., Hofer, K. & Farran, D. (2015, March). It's a pattern! The importance of early pattern knowledge for middle school mathematics achievement. Poster presented at the Society for Research in Child Development Conference. Philadelphia, Pa.

Fyfe, E.*, Rittle-Johnson, B., Loehr, A.*, Miller, M.^ (2014, April). Enhancing the Quality of Children's Explanations to Promote Patterning Knowledge. Paper presented at the annual meeting of the American Educational Research Association (AERA), Philadelphia, PA.

Fyfe, E.*, DeCaro, M.S.^ & Rittle-Johnson, B. (2014, April). The Role of Feedback Type and Working Memory Capacity During Problem Solving. Paper presented at the

annual meeting of the American Educational Research Association (AERA), Philadelphia, PA.

Loehr, A.*, Fyfe, E.*, Miller, M.^, & Rittle-Johnson, B. (2014, April). Learning from Explanations: Does It Matter Who Provides Them? Paper presented at the annual meeting of the American Educational Research Association (AERA), Philadelphia, PA.

Loehr, A.*, Rittle-Johnson, B., & Rajendran, A.* (2014, April). Promoting Mathematical Problem Solving and Explanation at Home. Poster presented at the annual meeting of the American Educational Research Association (AERA), Philadelphia, PA.

Rittle-Johnson, B., Fyfe, E.* Loehr, A.* & DeCaro, M.^ (2014, April) Learning from Explanation: The Timing and Source of Explanations for Learning Early Algebra. Paper presented at the annual meeting of the American Educational Research Association (AERA), Philadelphia, PA. Symposium organizer of "Different Perspectives on the Role of Explanation and Exploration in Learning."

Loehr, A.*, Rittle-Johnson, B., & Rajendran, A.*, (2013, October). Promoting mathematical problem solving and explanation at home. Poster presented at the Cognitive Development Society Conference, Memphis, TN.

Miller, M.^, Rittle-Johnson, B., Fyfe, E.*, & Loehr, A.* (2013, October). Importance of executive function for learning about patterns. Poster presented at the Cognitive Development Society Conference, Memphis, TN.

Loehr, A.*, Miller, M.^, DeCaro, M.^ & Rittle-Johnson, B. (2013, May). Semantic Verbal Fluency Predicts Mathematical Learning. Poster presented at the 25th Association for Psychological Science Annual Convention, Washington, DC.

Miller, M.^, Loehr, A.*, Fyfe, E.*, Rittle-Johnson, B., McLean, L.* & McEldoon, K.* (2013, May). Preschoolers' knowledge of repeating patterns over time. Poster presented at the 25th Association for Psychological Science Annual Convention, Washington, DC.

McEldoon, K. L.*, Liu, R.*, Rittle-Johnson, B. (2013, April). Verbal Imprecision in Mathematical Explanations as an Indicator of Learning. Poster presented at The Society for Research in Child Development Conference. Seattle, WA.

McEldoon, K. L.*, & Rittle-Johnson, B. (2013, April). Self-Explanation Improves Mathematics Learning in Low Prior Knowledge Students. Poster presented at The Society for Research in Child Development Conference. Seattle, WA.

Fyfe, E.*, DeCaro, M.^, & Rittle-Johnson, B. (2013, March). An Alternative Time for Telling: When Conceptual Instruction Prior to Exploration Improves Mathematical Knowledge. Paper presented at the Society for Research on Educational Effectiveness (SREE) Spring 2013 Conference, Washington, DC.

TEACHING

Courses Taught at Vanderbilt

Psy 8470 Cognitive Science to the Classroom (PhD seminar)
Psy 1250 Developmental Psychology
Psy 2250 Cognitive Aspects of Development
Psy 3650 Helping Children Learn Math seminar
Psy 2600 Educational Psychology
Psy 2980 Directed Research: supervise 4-10 undergraduates in my lab each term

Undergraduate Advising and Mentoring

Advisor for Undergraduate Honors Thesis students Alexander Kmicikewycz (2006), Junyi Chu (2015), Alexis Richmond (2023-24)
Faculty sponsor for Vanderbilt's Summer Research-Early Identification Program via the Leadership Alliance: Adriana Paola Mendez-Fernandez (2020/21), Yanira Garcia (2021), Ming Tate (2023)
Faculty sponsor for Vanderbilt University Summer Research Program (VUSRP) students: Kathryn Swygart (2004), Adam Porter (2007), Ran Liu (2012), Junyi Chu (2014), Aarushi Rohila (2021), Danny Xu (2021) and Brooke Poston (2023).
Immersion Advisor (Kenzy Elmessiry (2023), Sara Gregg (2023); Brooke Poston (2023), Ismail Mohyuddin (2022); Cree Diggs (2022))
Faculty sponsor for paid research internship for URM students at local HBCU's (Fisk University or Tennessee State University): Leah Wood (2021, TSU); JaNiya Gibson (2021); Jamila Brandon (2022, Fisk); Ranique Jackson (2019), Tykeena Watson (2019),

Faculty Advisor for high-school students through the Science for Mathematics and Science at Vanderbilt (2022) and through the Summer Research Experience for High-School Students program (2022)
Mentor 4-10 undergraduate research assistants from Vanderbilt each semester
Freshman advisor, 2003-2004; 2006-2007; 2008-2009; 2013-14; 2014-15
Academic advisor for 6 – 15 undergraduates each year (less while department chair)

Professional Student Advising

Research advisor for Cognitive Psychology in Context: Xinran (Wendy) Wang (2023-25); Lingfei (Fay) Cao (2024-26)
Research advisor for Child Studies: Faith Logan (2023-25)

Doctoral Student Advising

Major Professor for 9 Psychological Sciences students: Percival Matthews (2010 graduate; Associate Professor at University of Wisconsin Madison), Kelley Durkin (2012 graduate; Research Assistant Professor at Vanderbilt University), Katie McEldoon (2014 graduate; Federation of American Scientists), Emily Fyfe (2015 graduate; Associate Professor at Indiana University), Abbey Loehr (2018 graduate; Metropolitan Nashville Public Schools), Ashli-Ann Douglas (2022 graduate; West Ed), Jake Kaufman (2023 graduate; Premier Sports Psychology), Rebecca Adler (current) and Camille Msall (current).

Masters and Major Area Paper Committee Member for Raunak Pillai (CnC, 2022), Sarah Krowka (Special Education, 2017), Ayzit Doydum (CCN, 2016), Amelia Malone (Special Education, 2014), Jessica Min Namkung (Special Education, 2013), Michael Nelson (Quantitative Methods, 2013), Manya Whitaker (Developmental Science 2008), Jeff Nyquist (Cognitive Science 2005), Liane Moneta (Cognitive and Cognitive Neuroscience, 2012) and Gillian Starkey (Cognitive and Cognitive Neuroscience, 2012)

Dissertation Committee Member for Sarah Krowka (Special Education, 2018), Michael Nelson (Quantitative Methods, 2017), Amber Wang (Special Education, 2016), Liane Moneta (Cognitive and Cognitive Neuroscience, 2015) and Gillian Starkey (Cognitive and Cognitive Neuroscience, 2014), Amelia Malone (Special Education, 2015), Jessica Min Namkung (Special Education, 2014), Gabrielle Strouse (Developmental Science 2011), Manya Whitaker (Developmental Science 2011), Rebecca Watchorn (Developmental Science, University of Alberta 2011), Shanta Hattikudur (Developmental Psychology, Univ. of Wisconsin-Madison 2011), Sarah Powell (Special Education 2009), Robin Schumacher (Special Education 2010), Maria Mendiburo (Leadership, Policy & Organization 2010), Daryl Schneider (Cognitive Psychology 2009), Sean Hurley (Cognitive Psychology), and Thomas Katzlberger (Computer Science).

Post-Doctoral Research Associate Advising

Erica Zippert (2016-2020);
Marci DeCaro (2009-2011); now Associate Professor at Univ. of Louisville
Michael R. Miller (2011-2013); now Research Associate, Children's Health Research Institute and Department of Pediatrics, Western University
Roger Taylor (2008-2010 as secondary mentor); now Associate Director of Academic Assessment, Office of the Provost. Boston University

PROFESSIONAL SERVICE

James S. McDonnell Foundation Study Panel member for new funding program on translational research in cognitive science 2015 – 2016. Call for proposals under the new "Understanding Teacher Change and Teachers as Learners in K-12 Classrooms" was released in 2017: https://www.jsmf.org/apply/teachers-as-learners/

Spencer Foundation ad-hoc reviewer, 2017

Institute of Education Sciences' Basic Processes Scientific Review Panel, February 2010, 2011, 2012, Principle Panel Member 2014-2016. Post-Doctoral/Early Career Training Grant Panel 2013.

National Science Foundation Grant Review Panelist. (1) Training Grants May 2022 (2) EHR Core, January 2020; (3) CAREER - Learning Environments STEM, September 2014. Also conduct ad-hoc reviews.

Tenure and Promotion Reviews: 2023 (5); 2022 (4); 2021 (2); 2020 (2); 2018 (1); 2013 (1); 2012 (1)

Editorial Boards for *Review of Educational Research, 2021-2023; Journal of Educational Psychology* 2008-2013, 2015-18; *Journal of Experimental Child Psychology* 2009-2017; *Journal of Cognition and Development* 2009 – 2021(August).

Guest Action Editor for *Journal of Experimental Psychology: General* 2012.

Ad-hoc reviewer for *British Journal of Educational Psychology, Child Development, Cognition and Instruction, Cognitive Development, Developmental Psychology*, *Developmental Science, Instructional Science, Journal of Experimental Psychology: General, Journal for Research in Mathematics Education*, *Learning and Instruction, Mathematical Thinking and Learning, Mind and Brain, ZDM Mathematics, U.S. Department of Education Practice Guides,* the National Science Foundation, Netherlands Organisation for Scientific Research, and Canadian Language and Literacy Research Network.

Member, Digital Promise Learner Positioning System Math Advisory Board (see, for example: https://lvp.digitalpromiseglobal.org/content-area/math-3-6)

UNIVERSITY, COLLEGE AND DEPARTMENTAL SERVICE

Service to University and Peabody College

Member, Faculty advisory committee for Nashville Partnership for Educational Equity Research, Fall 2022 -
Peabody representative, University Continuity Working Group for operational challenges posed by the COVID-19 pandemic, May 2020-Fall 2020
Peabody representative, University Faculty Affairs committee, 2019-2020
Peabody representative, Lewis-Burke federal funding consultation committee, S2019
Member, PRI Director Search, 2015-2016, 2016-2017
Member, Special Education Faculty Search, 2015-2016, 2016-2017
Member, Faculty and Staff Benefits Committee, 2011-2014
Member, Faculty Council, 2011-2013, Chair of Curriculum Committee
Member, Peabody Faculty Award selection committee, 2012
Member, Peabody Endowed Chair Search committee, 2007-2009
Member, Peabody Diversity committee, 2007-2009
Graduate Faculty Delegate Assembly, 2006-2007; 2008-2009
Freshman advisor, 2003-2004; 2006-2007; 2008-2009
Member, Peabody Technology Committee 2003-2005
Member, IRB Task Force 2003-2004
Member, Peabody Learning Course Committee 2002-2003

Service to the Department

Department Chair, 2019-2023
Head, Developmental Sciences Program, Executive Committee member, 2013-2017
Search Committee Chair, 2013-14; 2014-15; 2015-16
Member, Undergraduate studies committee, 2011-2017
Member, Diversity committee, 2015-2017
Member, Faculty Review Committee, 2010-2011; 2012-2013; 2015-2016
Member, Developmental Psychology search committee 2003-2004; 2006-2007
Member, Graduate curriculum sub-committee, 2002-2003
Organizer, Graduate Student Psychology Day, 2006, 2007, 2009
Organizer, Psychological Sciences Graduate Student Recruitment Weekend, 2008

COMMUNITY SERVICE

Member, Alignment Nashville Math Action Team (2021 -). Identified goal and actions to support math learning outside of school. Launched a Summer Math

Challenge with community partners for summer 2023 that will be expanded in 2024.

"Creating a Math-Friendly Environment" (Jan, 2020) and "Math Patterns – Skills for Success" (Feb 2018) videos produced by Child Trends and disseminated on affiliate TV networks. https://www.childtrends.org/videos/math-patterns-skills-success https://positiveparentingnews.org/news-reports/creating-a-math-friendly-environment/

Expert roundtable member, National Governors Association Center for Best Practices, Strengthening early mathematics education initiative. 2013.

Member, Early Grades Math Advisory Committee, Tennessee Department of Education, Division of School Readiness and Early Learning, 2011.

Content developer, Tennessee Early Grades Math Toolkit, section in the Teacher Toolkit for Algebraic Thinking: readtennessee.org/math/teachers/teachers_mathematics_toolkit/mathematical_content_areas/algebraic_thinking.aspx

Speaker, Math Summit sponsored by Tennessee State Personnel Development Grant. February, 2012. Led 2 seminars with over 50 TN math teachers and instructional coaches.